

SHORT META-ANALYSIS · Peer-reviewed · Published · Same-author engine figures

RR/OR NMA: An Interactive R Shiny App for Conducting Frequentist Network Meta-Analysis of Ratio Outcomes

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KEY WORDS Network meta-analysis, NMA, netmeta, Shiny, R, frequentist, odds ratio, risk ratio, hazard ratio, inconsistency

Background

Network meta-analysis (NMA) is a valuable technique for comparing three or more treatments. Yet, performing the analysis and checking crucial factors such as consistency and bias tends to necessitate statistical programming abilities, and therefore represents a drawback in the meta-analysis of research studies with ratio measures (RR/OR, HR)

Methods

We created 786-MIII RR/OR NMA, an R (v4.4.0) and Shiny framework (v1.8.1.1) interactive web application with a bs4Dash (v2.3.2) dashboard layout. It performs frequentist NMA through the netmeta package (v[e.g., 2.8-1]). Data (arm-level for RR/OR binary; contrast-level for log-ratios) are uploaded via CSV. visNetwork and igraph are used for network plots. Results and Functionality: The 786-MIII RR/OR NMA offers functionalities for uploading data, choosing the outcome (binary RR/OR or survival/ratio HR), visualizing the network graph, conducting fixed- or random-effects NMA, and investigating results.

Outputs comprise forest plots (with RR/OR/HR) that can be customized, league tables, P-score rankings, inconsistency diagnostics (design decomposition, heat plots, node-splitting), comparison-adjusted funnel plots, and leave-one-out analysis. Results and plots can be downloaded as well

Conclusions

The 786-MIII RR/OR NMA provides a graphical workflow for the frequentist network meta-analysis (NMA) of ratio measures under the netmeta package. With integrated analysis, visualisation, and diagnostic capabilities, it is designed to optimize the accessibility and efficiency of NMA

Engine figures (live frequentist-NMA engine, same author)

This paper describes a frequentist network meta-analysis of ratio outcomes. The figures below are rendered directly from **LivingNMA** — an open-source, browser-based frequentist NMA engine by the same author (Mahmood Ahmad) that implements exactly this class of analysis (graph-theoretic frequentist NMA, node-splitting consistency, P-scores, comparison-adjusted funnel) — running one of its own bundled example networks of ratio outcomes. They illustrate the method the paper describes on open-ly-available example data, and are not output of the paper's own R Shiny build; because the engine is public, each figure can be reproduced first-hand. **Live engine:** <https://mahmood726-cyber.github.io/LivingNMA/>



Figure 1. Network Graph Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

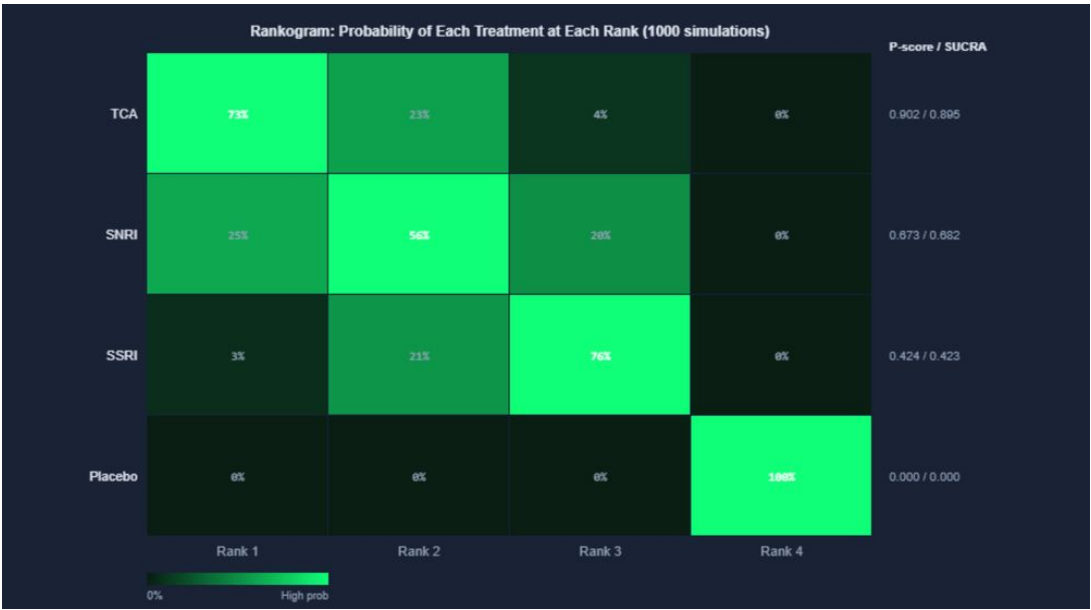


Figure 2. Rankogram (Salanti et al. 2011) — Probability of Each Rank Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

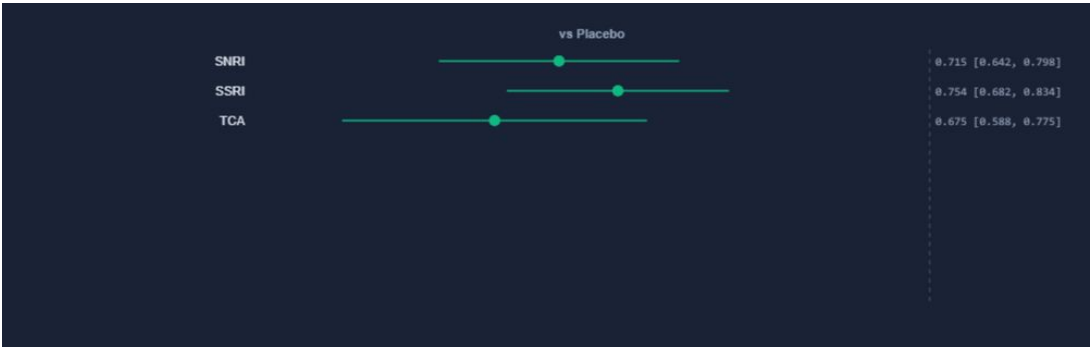


Figure 3. Forest Plot — All Comparisons vs Reference Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

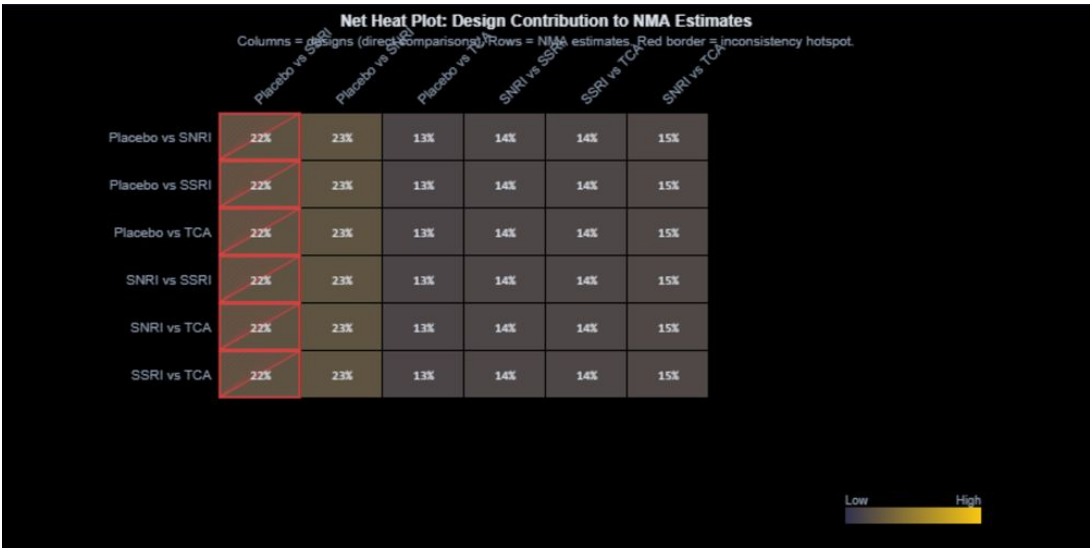


Figure 4. Net Heat Plot (Krahn et al. 2013) Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

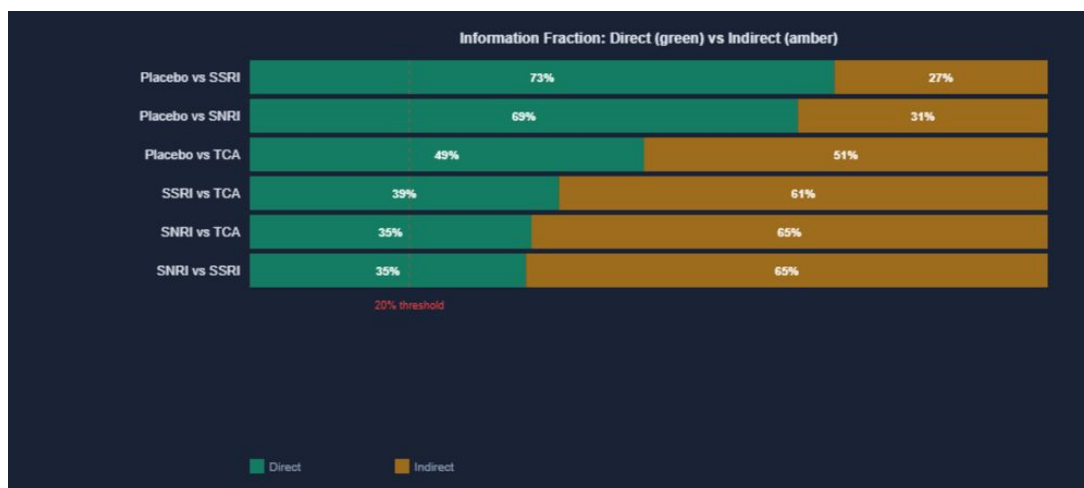


Figure 5. Information Fraction: Direct vs Indirect Evidence Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

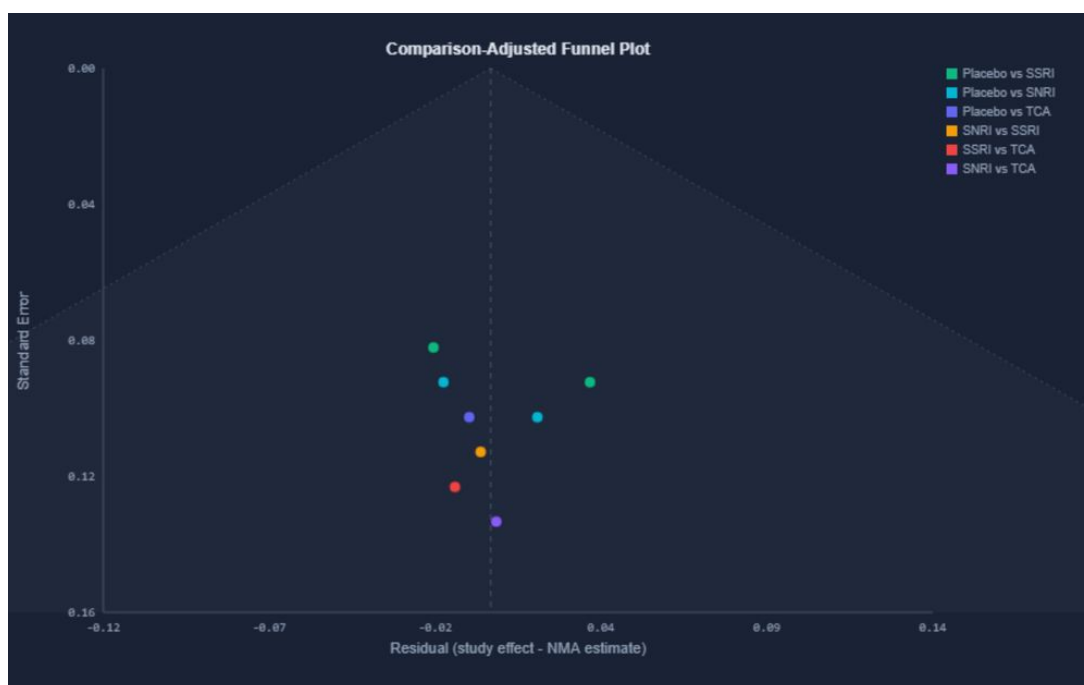


Figure 6. Comparison-Adjusted Funnel Plot (Chaimani & Salanti 2012) Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

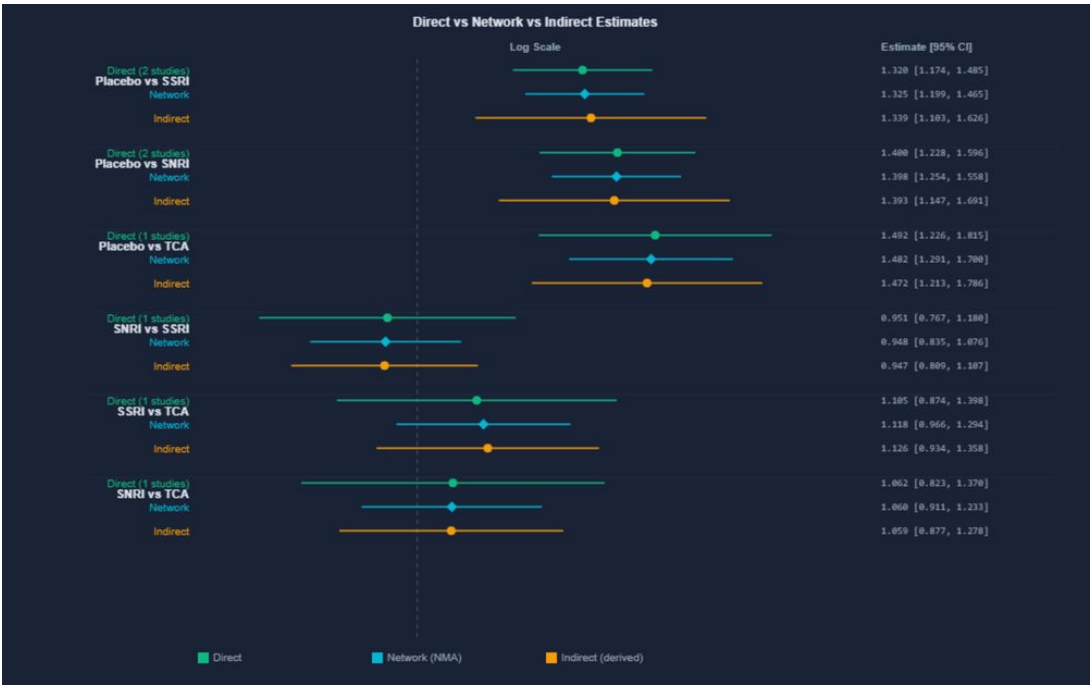


Figure 7. Direct vs Network Estimates (Split Forest) Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

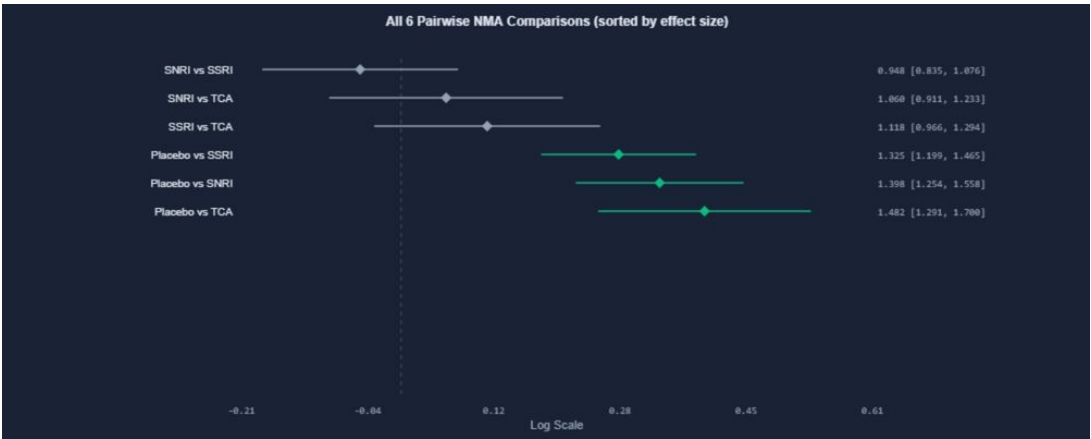


Figure 8. Network Forest Plot — All $T(T-1)/2$ Pairwise Comparisons Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.



Figure 9. Treatment Effect Surface Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

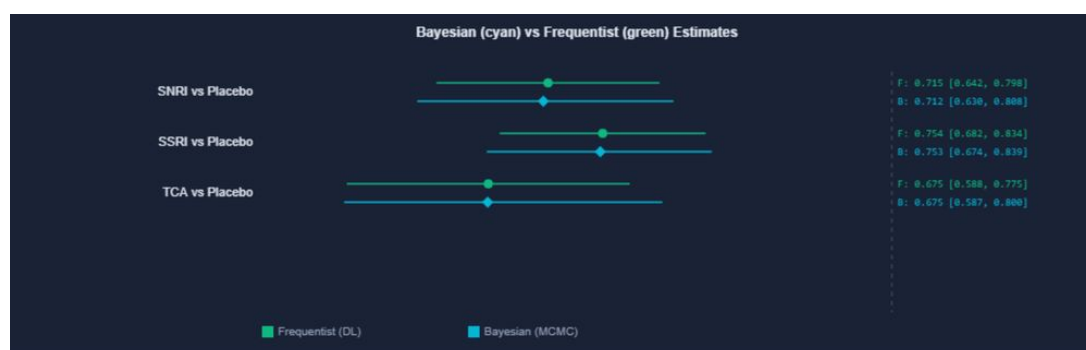


Figure 10. Bayesian vs Frequentist Comparison Rendered from the open LivingNMA engine (same author) running one of its bundled ratio-outcome example networks.

HOW TO CITE

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Reproducibility & data provenance. The figures above are rendered from <https://mahmood726-cyber.github.io/LivingNMA/> (LivingNMA, an open frequentist-NMA engine by the same author) running its own bundled ratio-outcome example network. They demonstrate the method this paper describes on openly-available example data, and are not output of the paper's original R Shiny application; because the engine is public, each figure can be reproduced first-hand. The article text, authors and abstract follow the journal's published record.

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